

USSN 10/699,289

PATENT

-4-

45

In the Claims

The claims currently pending in the application are as follows:

1. (cancelled)

2. (currently amended) The band-pass filter of claim 3, in which the acoustic decoupler is structured to provide substantially critical coupling of acoustic energy between the FBARs.

3. (currently amended) A band-pass filter characterized by a center frequency, the band-pass filter comprising:

a stacked pair of film bulk acoustic resonators (FBARs), each of the FBARs comprising opposed planar electrodes and a layer of piezoelectric material between the electrodes; and

an acoustic decoupler between the FBARs, the acoustic decoupler comprising a single layer of acoustic decoupling material having a nominal thickness equal to an odd integral multiple of one quarter of the wavelength in the acoustic decoupling material of an acoustic wave having a frequency equal to the center frequency, the acoustic decoupling material comprising plastic.

4. (original) The band-pass filter of claim 3, in which:
the piezoelectric material has an acoustic impedance; and
the acoustic decoupling material has an acoustic impedance less than the acoustic impedance of the piezoelectric material.

5. (original) The band-pass filter of claim 3, in which:
the piezoelectric material has an acoustic impedance; and
the acoustic decoupling material has an acoustic impedance intermediate between the acoustic impedance of the piezoelectric material and the acoustic impedance of air.

USSN 10/699,289

PATENT

-5-

6. (original) The band-pass filter of claim 3, in which the acoustic decoupling material has an acoustic impedance in the range from about 2 Mrayl to about 16 Mrayl.

7. (cancelled)

8. (original) The band-pass filter of claim 3, in which the acoustic decoupling material comprises polyimide.

9. (original) The band-pass filter of claim 3, in which the acoustic decoupling material comprises poly(para-xylylene).

10. (cancelled)

11. (currently amended) The band-pass filter of claim ~~10~~, 19, in which the acoustic decoupling material comprises plastic.

12. (currently amended) The band-pass filter of claim ~~10~~, 19, in which the acoustic decoupling material comprises polyimide.

13. (currently amended) The band-pass filter of claim ~~10~~, 19, in which the acoustic decoupling material comprises poly(para-xylylene).

14. (previously presented) The band-pass filter of claim 3, in which:
the layer of acoustic decoupling material has a nominal thickness equal to one quarter of the wavelength in the acoustic decoupling material of an acoustic wave having a frequency equal to the center frequency.

15. (cancelled).

USSN 10/699,289

PATENT

-6-

16. (cancelled)

17. (cancelled).

18. (cancelled)

19. (currently amended) A band-pass filter characterized by a center frequency, the
~~The band-pass filter of claim 3 additionally comprising:~~

a stacked pair of film bulk acoustic resonators (FBARs), each of the FBARs
comprising opposed planar electrodes and a layer of piezoelectric material between the
5 electrodes;

an acoustic decoupler between the FBARs, the acoustic decoupler comprising a
single layer of acoustic decoupling material having a nominal thickness equal to an odd
integral multiple of one quarter of the wavelength in the acoustic decoupling material of an
acoustic wave having a frequency equal to the center frequency; and

10 an electrical connection between adjacent ones of the electrodes of the FBARs.

20. (original) The band-pass filter of claim 19, in which the acoustic decoupler is located between the adjacent ones of the electrodes.

21. (previously presented) The band-pass filter of claim 3, additionally comprising a ladder filter electrically connected in series with the stacked pair of FBARs.

22. (original) The band-pass filter of claim 21, in which the ladder filter comprises additional FBARs.

USSN 10/699,289

PATENT

-7-

23. (previously presented) A band-pass filter, comprising:

a stacked pair of film bulk acoustic resonators (FBARs), each of the FBARs comprising opposed planar electrodes and a layer of piezoelectric material between the electrodes;

5 an acoustic decoupler between the FBARs; and

a ladder filter comprising additional FBARs, the ladder filter electrically connected in series with the stacked pair of FBARs, in which:

the band-pass filter additionally comprises an electrical connection between adjacent ones of the electrodes of the stacked pair of FBARs and the ladder filter; and

10 the remaining ones of the electrodes of the stacked pair of FBARs provide the output terminals of the band-pass filter.

24. (currently amended) A band-pass filter characterized by a center frequency, the band-pass filter comprising:

a stacked pair of film bulk acoustic resonators (FBARs), each of the FBARs comprising opposed planar electrodes and a layer of piezoelectric material between the electrodes, the piezoelectric material having an acoustic impedance; and

5 between the FBARs, a single layer of acoustic decoupling material having a nominal thickness equal to an odd integral multiple of one quarter of the wavelength in the acoustic decoupling material of an acoustic wave having a frequency equal to the center frequency, the acoustic decoupling material comprising plastic having an acoustic impedance less than

10 the acoustic impedance of the piezoelectric material.

25. (original) The band-pass filter of claim 24, in which the acoustic decoupling material comprises one of polyimide and poly(para-xylylene).

USSN 10/699,289

PATENT

-8-

26. (currently amended) An electrical filtering method, comprising:
providing a pair of film bulk acoustic resonators (FBARs);
applying an input electrical signal to one of the FBARs;
coupling, by no more than one layer of acoustic decoupling material located between
5 the FBARs, less acoustic energy between the FBARs than would be coupled by direct
contact between the FBARs, the acoustic decoupling material comprising plastic; and
outputting a filtered output electrical signal from the other of the FBARs.

27. (previously presented) An electrical filtering method, comprising:
providing a pair of film bulk acoustic resonators (FBARs);
applying an input electrical signal to one of the FBARs;
coupling less acoustic energy between the FBARs than would be coupled by direct
5 contact between the FBARs, the coupling establishes a first pass bandwidth;
prior to the applying, filtering the input electrical signal with a second pass
bandwidth narrower than the first pass bandwidth; and
outputting a filtered output electrical signal from the other of the FBARs.

28. (cancelled)

29. (cancelled)

30. (cancelled)